

What is claimed is:

- 1           1. A remaining recordable time calculation apparatus
- 2     that calculates remaining recordable time of a recording
- 3     medium, the recording medium containing one or more video
- 4     streams and corresponding management information, and the
- 5     one or more video streams being compressed when recorded on
- 6     the recording medium,
- 7           the remaining recordable time calculation apparatus
- 8     comprising:
- 9           management data read means for reading a capacity of
- 10    the recording medium and data sizes of the one or more video
- 11    streams;
- 12           calculation parameter holding means for holding the
- 13    following calculation parameters,
- 14           (1) an estimate error value for estimating at least one
- 15    of: an estimate error occurring during compression of a video
- 16    stream, and a size of an unrecordable area inherent in the
- 17    recording medium,
- 18           (2) a standard bit rate being a bit rate used in
- 19    compressing a video stream to be recorded on the recording
- 20    medium; and
- 21           time calculation means for calculating the remaining
- 22    recordable time by dividing a free area size of the recording
- 23    medium by the standard bit rate, where the free area size
- 24    is obtained by subtracting the data sizes of the one or more

25 video streams and the estimate error value from the capacity  
26 of the recording medium.

1           2. The remaining recordable time calculation apparatus  
2 of Claim 1, further comprising display means for displaying  
3 the remaining recordable time calculated by the time  
4 calculation means,

5           wherein the display means displays a ratio of the free  
6 area size to the capacity of the recording medium in a graphical  
7 form.

1           3. The remaining recordable time calculation apparatus  
2 of Claim 1, further comprising instruction receiving means  
3 for receiving a user selection of a video stream out of the  
4 one or more video streams stored in the recording medium,  
5 and display means for displaying the remaining recordable  
6 time calculated by the time calculation means,

7           wherein the display means displays a ratio of a compressed  
8 data size of the selected video stream, to the capacity of  
9 the recording medium in a graphical form.

1           4. The remaining recordable time calculation apparatus  
2 of Claim 3, further comprising stream decoding means for  
3 decoding a compressed data of the video stream,

4           wherein the display means further displays an image of  
5 the video stream decoded from the stream decoding means.

1           5. The remaining recordable time calculation apparatus  
2 of Claim 1, further comprising management data write means  
3 for writing the capacity of the recording medium and a  
4 compressed data size of a video stream, to the recording medium  
5 as the management data,

6           wherein the management data read means reads out the  
7 capacity of the recording medium and the compressed data size,  
8 written by the management data write means.

1           6. The remaining recordable time calculation apparatus  
2 of Claim 1,

3           wherein the capacity of the recording medium and the  
4 data sizes of the one or more video streams are included in  
5 management information generated in accordance with a  
6 recording standard of the recording medium.

1           7. A remaining recordable time calculation apparatus  
2 that calculates remaining recordable time of a recording  
3 medium, the recording medium containing one or more video  
4 streams and corresponding management information, and the  
5 one or more video streams being compressed when recorded on  
6 the recording medium,

7           the remaining recordable time calculation apparatus  
8 comprising:

9           management data read means for reading, from the  
10 recording medium, running time of the one or more video streams;

11 total time holding means for holding a total time period  
 12 for which recording is possible on the recording medium,  
 13 hereinafter referred to as 'the total time', the total time  
 14 being obtained by first subtracting an estimate error value  
 15 from a capacity of the recording medium, and then by dividing  
 16 the subtraction result by a standard bit rate,

17 wherein an estimate error value estimating at least one  
 18 of: an estimate error occurring during compression of a video  
 19 stream, and a size of an unrecordable area inherent in the  
 20 recording medium, and the standard bit rate is a bit rate  
 21 used in compressing a video stream to be recorded on the  
 22 recording medium; and

23 time calculation means for calculating the remaining  
 24 recordable time by subtracting the running time of the one  
 25 or more video streams from the total time.

1 8. The remaining recordable time calculation apparatus  
 2 of Claim 7, further comprising display means for displaying  
 3 the remaining recordable time calculated by the time  
 4 calculation means,

5 wherein the display means displays a ratio of the  
 6 remaining recordable time calculated by the time calculation  
 7 means, to the total time in a graphical form.

1 9. The remaining recordable time calculation apparatus  
 2 of Claim 7, further comprising instruction receiving means

3   for receiving a user selection of a video stream out of the  
4   one or more video streams, and display means for displaying  
5   the remaining recordable time calculated by the time  
6   calculation means,

7            wherein the display means displays a ratio of the running  
8   time of the selected video stream to the total time in a  
9   graphical form.

1           10. The remaining recordable time calculation apparatus  
2 of Claim 9, further comprising stream decoding means for  
3 decoding a compressed data of the video stream,

4            wherein the display means further displays an image of  
5    the video stream decoded by the stream decoding means.

1           11. The remaining recordable time calculation apparatus  
2   of Claim 7,

3           wherein the management data read means further reads  
4   compression bit rates recorded in one to one relation with  
5   the running time of each of the one or more video streams,  
6           and wherein the time calculation means obtains remaining  
7   recordable time by subtracting adjusted running time of each  
8   of the one or more video streams from the total time, the  
9   adjusted running time being adjusted according to a ratio  
10   of the compression bit rates to the standard bit rate.

1 12. The remaining recordable time calculation apparatus

2 of Claim 11, further comprising a management data write means  
 3 for writing running time of a video stream to be added and  
 4 a corresponding compression bit rate to the recording medium  
 5 as the management data,

6 wherein the management data read means reads out the  
 7 running time of the video stream and the corresponding  
 8 compression bit rate written by the management data write  
 9 means.

1 13. The remaining recordable time calculation apparatus  
 2 of Claim 7,

3 wherein the running time of the video stream is included  
 4 in management information generated in accordance with a  
 5 recording standard of the recording medium.

1 14. A remaining recordable time calculation apparatus  
 2 that calculates remaining recordable time of a recording  
 3 medium, the recording medium containing one or more video  
 4 streams and corresponding management information, and the  
 5 one or more video streams being compressed when recorded on  
 6 the recording medium,

7 the remaining recordable time calculation apparatus  
 8 comprising:

9 management data read means for reading, from the  
 10 recording medium, a capacity of the recording medium and data  
 11 sizes and running time of the one or more video streams;

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calculation parameter holding means for holding the following calculation parameters,

(1) an estimate error value estimating at least one of: an estimate error occurring during compression of a video stream, and a size of an unrecordable area inherent in the recording medium,

(2) a standard bit rate being a bit rate used in compressing a video stream to be recorded on the recording medium;

total time holding means for holding a total time period for which recording is possible on the recording medium, hereinafter referred to as 'the total time', where the total time is obtained by first subtracting the estimate error value from the capacity of the recording medium and then by dividing the subtracted result by the standard bit rate;

first time calculation means for calculating first remaining recordable time by dividing a free area size of a recording medium by the standard bit rate, where the free area size is obtained by subtracting the data sizes and the estimate error value from the capacity of the recording medium;

second time calculation means for calculating second remaining recordable time by subtracting the running time from the total time; and

select means for selecting a shorter one of the first and the second remaining recordable time, so as to present

37 the shorter time as the remaining recordable time to users.

1 15. The remaining recordable time calculation apparatus  
2 of Claim 14, further comprising display means for displaying  
3 the remaining recordable time selected by the select means,  
4 wherein the display means displays either a ratio of  
5 the free area size to the capacity of the recording medium,  
6 or a ratio of the remaining recordable time to the total time,  
7 in a graphical form.

1 16. The remaining recordable time calculation apparatus  
2 of Claim 14, further comprising instruction receiving means  
3 for receiving a user selection of a video stream out of the  
4 one or more video streams, and display means for displaying  
5 the remaining recordable time selected by the select means,  
6 wherein the display means displays either a ratio of  
7 a compressed data size of the selected video stream to the  
8 capacity of the recording medium, or a ratio of a running  
9 time of the selected video stream to the total time, in a  
10 graphical form.

1 17. The remaining recordable time calculation apparatus  
2 of Claim 16, further comprising stream decoding means for  
3 decoding a compressed data of the video stream,  
4 wherein the display means further displays an image of  
5 the video stream decoded from the stream decoding means.



18. The remaining recordable time calculation apparatus  
of Claim 14,

wherein the management data read means further reads  
compression bit rates recorded in one to one relation with  
the running time of each of the one or more video streams,

and wherein the second time calculation means obtains remaining recordable time by subtracting adjusted running time of each of the one or more video streams from the total time, the adjusted running time being adjusted according to a ratio of the compression bit rates to the standard bit rate.

19. The remaining recordable time calculation apparatus of Claim 18, further comprising management data write means for writing running time, a corresponding compression bit rate, and a data size of a video stream to be added, and the capacity of the recording medium to the recording medium as the management data,

wherein the management data read means reads out the running time, the corresponding compression bit rate, and the data size of the video stream to be added, and capacity of the recording medium, written by the management data write means.

1           20. The remaining recordable time calculation  
2 apparatus of Claim 14,  
3           wherein the running time and the data sizes of the one  
4 or more video streams, and the capacity of the recording medium  
5 are included in management information generated in accordance  
6 with a recording standard of the recording medium.